

CLAIMS

1. A silicon carbide single crystal containing an uncompensated impurity in an atomic number density of at least $1 \times 10^{15}/\text{cm}^3$ and containing vanadium in less than a concentration of said uncompensated impurity.

2. A silicon carbide single crystal as set forth in claim 1, wherein said uncompensated impurity has a concentration of not more than $1 \times 10^{17}/\text{cm}^3$.

3. A silicon carbide single crystal as set forth in claim 1, wherein said uncompensated impurity has a concentration of not more than $5 \times 10^{16}/\text{cm}^3$.

4. A silicon carbide single crystal as set forth in any one of claims 1 to 3, wherein said uncompensated impurity gives a conductivity type of an n type.

5. A silicon carbide single crystal as set forth in claim 1, wherein said vanadium has a concentration of at least $5 \times 10^{14}/\text{cm}^3$.

6. A silicon carbide single crystal as set forth in claim 1, wherein said vanadium has a concentration of not less than $1 \times 10^{15}/\text{cm}^3$.

7. A silicon carbide single crystal as set forth in claim 1, wherein said vanadium has a concentration of not less than $1 \times 10^{16}/\text{cm}^3$.

8. A silicon carbide single crystal as set forth in any one of claims 1 to 7, wherein the difference in concentration of said uncompensated impurity and said vanadium is not more than $1 \times 10^{17}/\text{cm}^3$.

9. A silicon carbide single crystal as set forth in any one of claims 1 to 7, wherein the difference in concentration of said uncompensated impurity and said vanadium is not more than $5 \times 10^{16}/\text{cm}^3$.

10. A silicon carbide single crystal as set forth in any one of claims 1 to 7, wherein the difference in concentration of said uncompensated impurity and said vanadium is not more than $1 \times 10^{16}/\text{cm}^3$.

11. A silicon carbide single crystal as set forth in any one of claims 1 to 10, wherein said silicon

carbide single crystal has a main polytype of 3C, 4H, or 6H.

12. A silicon carbide single crystal as set forth in any one of claims 1 to 10, wherein said silicon
5 carbide single crystal has a main polytype of 4H.

13. A silicon carbide single crystal wafer obtained by processing and polishing a silicon carbide single crystal as set forth in any one of claims 1 to 12, wherein said wafer has an electrical resistivity at room
10 temperature of at least $5 \times 10^3 \Omega\text{cm}$.

14. A silicon carbide single crystal wafer obtained by processing and polishing a silicon carbide single crystal as set forth in any one of claims 1 to 12, wherein said wafer has an electrical resistivity at room
15 temperature of not less than $1 \times 10^5 \Omega\text{cm}$.

15. A silicon carbide single crystal wafer as set forth in claim 13 or 14, wherein said silicon carbide single crystal wafer at room temperature is a single polytype of 3C, 4H, or 6H.

20 16. A silicon carbide single crystal wafer as set forth in claim 13 or 14, wherein said silicon carbide single crystal wafer is comprised of a single polytype of 4H.

25 17. A silicon carbide single crystal as set forth in any one of claims 13 to 16, wherein said wafer has a size of at least 50 mm.

18. A silicon carbide single crystal as set forth in any one of claims 13 to 16, wherein said wafer has a size of at least 100 mm.

30 19. An epitaxial wafer comprised of a silicon carbide single crystal as set forth in any one of claims 13 to 18 on the surface of which a silicon carbide thin film is grown.

35 20. An epitaxial wafer comprised of a silicon carbide single crystal as set forth in any one of claims 13 to 18 on the surface of which a potassium nitride, aluminum nitride, or indium nitride thin film or mixed

crystal thin film of the same is grown.

21. A method of production of a silicon carbide single crystal by using a sublimation recrystallization method using a seed crystal to grown a single crystal,
5 said method of production of a silicon carbide single crystal characterized by using a sublimating material comprised of silicon carbide and vanadium or a vanadium compound in a mixture and using for the crystal growth a graphite crucible having a nitrogen concentration of not
10 more than 50 ppm as measured by an inert gas fusion thermal conductivity method.

22. A method of production of a silicon carbide single crystal as set forth in claim 21, wherein said graphite crucible has a nitrogen concentration of not
15 more than 20 ppm.

23. A method of production of a silicon carbide single crystal as set forth in claim 21, wherein said graphite crucible has a nitrogen concentration of not
more than 10 ppm.

24. A method of production of a silicon carbide single crystal as set forth in any one of claims 21 to 23, wherein said graphite crucible is a graphite crucible treated for purification by being held in an inert gas atmosphere of a pressure of not more than 1.3 Pa at a
20 temperature of 1400°C or more for 10 hours to less than 120 hours.

25. A method of production of a silicon carbide single crystal as set forth in any one of claims 21 to 23, further comprising charging the graphite crucible
30 with a material powder mainly comprised of silicon carbide and, in that state, treating the graphite crucible for purification by holding it in an inert gas atmosphere at a pressure of not more than 1.3 Pa at a temperature of 1400 to 1800°C for 10 hours to less than
35 120 hours, placing said graphite crucible and seed crystal in an inert gas atmosphere adjusted in pressure

to 1.3×10^2 to 1.3×10^4 Pa, and heating to 2000°C or more, then starting crystal growth.

26. A method of production of a silicon carbide single crystal as set forth in claim 24 or 25, wherein
5 said purification treatment is performed at a pressure of 1.3×10^{-1} Pa or less.

27. A method of production of a silicon carbide single crystal as set forth in claim 24 or 25, wherein
10 said purification treatment is performed at a pressure of 6.5×10^{-2} Pa or less.

28. A method of production of a silicon carbide single crystal as set forth in any one of claims 24 to 27, wherein after said purification treatment, said
15 graphite crucible is used for crystal growth without being exposed to the atmosphere.